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Cranial Osteopathy Fact or Fiction

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## Abstract

As presented in the original model of cranial osteopathy, intrinsic rhythmic movements of the human brain cause rhythmic fluctuations of cerebrospinal fluid and specific relational changes among dural membranes, cranial bones, and the sacrum. Practitioners researching/practicing cranial osteopathy believe they can palpably modify parameters of this mechanism to return slight discords in the pulsation and position back into balance to the patient's health advantage.

Primary respiration is related to the movement of spheno-basilar synchondrosis. That fact actually suggests that the knowledge of complete ossification, which occurs at the articulation after the pubertal phase, makes the idea of practitioner's hands recognizing the meninges and further manipulate it, one hard concept to accept, let alone prove. So we rely on the anatomical point of view, which clearly shows us that the fascial system involves the meninges, and that when looking at it from the microcellular point of view there is no layering, which means there is no divide between tissues which would allow for any kind of movement. However, there is the quantum physics point of view, which suggests that cranial palpation allows the practitioner to come into contact with the meninges. The data comes from a recent scientific evidence, which suggests that meningeal afferents indeed can affect extracranial areas and that the pericranial musculature itself is able to influence these afferents.

The application of cranial osteopathy is always controversial in any literature or research, and it is primarily due to the lack of biological plausibility in the mechanism. From a scientific point of view it shows no diagnostic reliability, and with that it also shows little hope that any direct clinical effect will ever be shown. However despite the fact cranial osteopathy remains popular with many practitioners and patients. And as aimed with this paper there are some highlights that support cranial osteopathy based on scientific information that could help cranial osteopathy to improve cranial work.

## Origin and present

Cranial osteopathy was discovered, developed and taught by William Garner Sutherland, a former student of A.T. Still's American School of Osteopathy, in the 1900's. His theory developed while still studying Osteopathy by observation he made looking at a skull. The articulations as he described looked like fish scales suggesting a sense of motion and respiration, from there on research Sutherland underwent determined there is a palpable movement in the body that occurs in conjunction with the motion of the bones of the head. A rhythmic alternating expansion and contraction motion in the cranium which is part of what he termed the primary respiratory mechanism or PRM.

Sutherland had an interesting way of testing his theories and research the effect of imbalance on the skull. This was one of the first so called scientific researches on cranial structure. He developed a helmet which was capable of restricting individual cranial bones, and would periodically wire up pressure to different cranial bones, write down any observations and symptoms, from temperamental changes to loss of consciousness. His experiments supported the conclusion that, not only did the cranial bones move, but the sacrum did also, by way of the membranes connecting the two.

The way Sutherland came to conclusions was a remarkable breakthrough. Eventually he was also able to achieve considerable clinical success with his patients as well. The research was

extended to children and newborn babies as well, where the restrictions imposed by the birthing process came to light.

Harold Magnoun carried the torch forward and taught Dr. John E. Upledger in the late 1960's who took on and developed techniques of cranial osteopathy into what he called Craniosacral therapy. It was a simplified system of treatment capable of being passed on/taught to anyone who intended to study the system. What once was a privilege of osteopathic doctors to study was now accessible to everyone who desired to learn, as it required no extensive medical training to be effective. What derived from Still and Sutherland, now developed into Upledger's lifetime and became a holistic therapy aimed at assisting the client to employ their own body's healing capacities and trust that all bodies have an inherent intelligence to desire balance, thus heal itself.

### The debate and the science

In the scientific world, the approach with cranial osteopathy gets quite the attention in debate. Main conflict is that at present time, there is still no absolute recognition of the effect of cranial treatment in the field of international literature pertaining to research. The latest revisions describe the fallacious scientific depth and the poor methodology applied in carrying out the research, pushing the medical discipline to the borders of the credible. However in the whole concept we have two sides to the facts, one is strictly scientific and medically researched, while the other is considered modern theory of quantum physics of the structure.

To apply the scientific anatomic standard of the concept, ossification of synarthrosis is an ongoing process that lasts well through puberty up to one's 20th year of age. And as years progress it only becomes less and less moveable, considering the two vaults fully ossified in elderly. Now anatomically cranium begins as 22 different bones which later in life ossify. The connection between sutures consists of so called Sharpey's fibres, which in itself are described as a matrix of connective tissue consisting of bundles of strong collagenous fibers connecting periosteum to bone. With that said human cranium seemingly is deemed to be quite immobile, fixated structure, with no movement plausible in any of the connections of cranial bones.

However for bone to grow and initially mineralize during endochondral and intramembranous ossification, there must be a presence of blood vessels in order for bone to grow (Marks and Odgren, 2002). Multiple papers refer to presence of angiogenesis in craniosynostosis and osteogenesis (Dietrich and Antoniadis, 2012; Percival, 2013), leading on the presence of fluids around the ossification marks.

This Scientific review of ossification of cranium directly contradicts the concept of primary respiratory system existence, as it allows for no room for any type of sensory movement detected through palpation, no matter how miniscule. Though on the other hand, through reviewing old research journals of Dr. Sutherland's cranial researches, they offer little detail on actual scientific reasoning, yet provide outcomes based on treatment of diagnosed inconsistencies in cranial problematics.

In Upledger's research conducted with Dr. Roppell's assistance, it was determined that in terms of the patient's ability to determine whether small movements had occurred or not was practically impossible. So testing conveyed of multiple doctors reporting movements.

Doctors were of different backgrounds and different majors. Overall reports however came to a conclusion that real movement is present.

Conducting further research on the cranium of patients aged 7 through 57 resulted in Dr. Retzlaff experimented with pressure and straining techniques, confirming that there was a definite potential for the movement, as was previously carefully documented by Dr. Roppell.

Findings Dr. Retzlaff and Dr. Upledger documented consisted of an abundance of collagen and elastic fibers; a multitude of blood vessels and vascular networking with relatively free communication with the Haversian canals of the bone; the equivalent of Sharpey's collagen fibers anchored deeply in the bone and offering limits to the amount of potential motion between the two bones involved in suture formation; nerve fibers and networks accompanying many collagen fibers and all of the vasculature; and stretch and pressure receptors within the intra-sutural material. Sutures from adults were not calcified as was the belief and teaching of most anatomists in western Europe and the American continents.

I found the difference between the two concepts of Anatomical understanding was different approaches to research. As the documentation in Upledger's research suggests, they were not the only party getting to the same conclusions. One of his lectures clashed with doctors supporting the same theory, as their education used the very same conclusions to research being of Italian origin. The difference in opinions only came from UK doctors where the claim was that cranial bones fuse rather early in life.

#### The Practice and evidence

It's fairly easy to brush cranial osteopathy as myth, given the science does not agree on the topic of ossification of cranium. Which gives the plausibility factor a bit of a stretch trying to find which research is more probable. However the fact of the matter is that any research conducted should weigh heavily on the evidence based experiment from a practitioner's clinical experience point of view, then from patient's experience point of view, as well as overall experimental research. Any external clinical research is deemed to be evidence of informed consistency, which can not replace individual's clinical expertise, and can not be the expertise that decides whether it applies to individual patients, as any practitioner would note each individual, with however similar symptoms and diagnosis will react to different movements, treatments, processes, even timelines, differently. So therefore the external research result can not dictate a clinical decision, it is however a well taken general outlook on the situation.

One of the examples being synchondrosis between the occipital bone and the sphenoid bone. When ossified this structure does not create movement, such as flexion-extension, yet the pressure leading in and out or building as it mis-positions itself in a slight compression allows for a release, which one can perceive as movement, one such as practitioner skilled to detect such small movements, yet scientific evidence of external clinical source will stick to the fact that the two are fused and do not move. Yet the constant of evidence building up to show that there is a movement present at cranial structures did inspire more research which resulted in recent scientific notions which show that most cranial sutures or synarthrosis are patent.

The patency of cranium was also supported by the facts that the sutures consist of extracellular matrix, proteoglycans, collagen fibers and water; which implies that the occipitoparietal has a modulus of elasticity and absorption, which also leads on to have an ability to absorb mechanical stress. Stress absorption further is supported by the mechanical

role sutures play in external influences. For example, their role is to cushion the extracranial tension towards the skull, and intracranial towards the outside. Another scientific information also supports the fact that cerebral mass moves caudomedial and cranio-laterally through the guided motion of the heartbeat and respiratory diaphragm, which at the same time, during inspiration, oscillate the neocortex and the limbic area.

Dura mater, being the outermost layer of meninges, is a connective tissue wrapping around the brain as well as spinal cord. Its functions are multiple but to keep it to the minimum and address its relevance, as I am trying to make, so the very important function it holds is that it carries blood from the brain toward the heart. With that explained the fact dura mater has the ability to adjust/change the mechanical tension of extracranial musculature and cervical components quite the same way as the pericranial musculature has the ability to influence the mechanical dural tension. There is also a presence of mutually beneficial relationship of dura mater and the pericranial musculature, fascia, and the presence of trigeminal dural nerve endings as it crosses the suture and innervates the myofascial system of the skull, has been demonstrated as well.

Liquids are a well important fascial component in the entire body, hence the extracellular matrix, the interstitial fluids, blood, lymph, liquor and all the same cells full of water. The dynamic of all cells oscillating and aggregating to form tissues helps create further mechanical tension, which travels faster in the liquid tissues and in overview creating a sort of wet network.

With all the above taken into consideration, some sort of movement other than heart beat, is absolutely present in the cranium as well as body. Palpation can be trained and the sensation of it measured in microns. The movement of cranial myofascial system and intracranial meningeal system can be perceived through interaction between practitioner's hands and patient's skull. When the hands of a practitioner are resting on the skull of the patient, or in other words myofascial system, the pressure emitted is perceived by the extracranial trigeminal afferents.

Looking at quantum physics, it may help us further our understanding, as palpation is considered interactive communication between the practitioner and patient, where all the palpated and not palpated tissues have the awareness of mechanical operation that comes from placed hands on the skull, which would be perceived as quantum entanglement. The practitioner's hand emits an electromagnetic field, as well as the patient's skull, and the magnetic forces or as also known as vibrations, shape the morphology of the cell by relations of electromagnetic field and living cell, which becomes a mechanical stimulus felt by extracranial terminations trigeminal. Considering electromagnetic fields travel at higher speeds than the electric flow, as it crosses the whole body, the touch of the osteopathic practitioner seemingly goes beyond the skull. With the cranial sutures being patent even in old age, it means miniscule millimeter movements of the brain during systole and diastole of heart cycle, and the contractions of the diaphragm muscle implemented by the cranial synarthrosis could influence the movement of the brain mass, but those are not the only contributors to the movement, the same movement may also appear when contractions of different components push against the oscillated brain areas such as the hippocampus and the limbic area during breathing.

## Conclusion to realistic results

As presented in the beginning of this paper, the approach with cranial osteopathy is much debated, main objective being that there is no absolute recognition of scientific proof of effect of cranial treatment in any international literature. With explaining the process of cranial methodology the debate expands to the point of whether the primary respiratory system is in fact a fact or fiction, or if there is a possibility of practitioners to be trained to actually feel the movement of such miniscule proportions. As I expand the topic of existing measuring tools to detection of the cranial movement and present the Dr. Upledger and his colleagues researched, they mainly remain the last scientific papers to look into pathological connections with movement proving driven experiments. All recent research data is based on external theories and in clinic practical experiments. I could not find any similar research to Dr. Upledger to be set in the recent years.

Therefore as some debates incline the reliability of the physics allowing one to believe a trained practitioner is able to tap into communication with the liquid of cranial lymph, the question expands to whether it is possible to tap beyond the cranial bones that had allegedly been fused in youth. The sensory ability of a trained practitioner when palpating, to listen to the most miniscule movements and variations of tension presence definitely is dictated by the measure of cranial movement, which would also confirm the presence of the above mentioned ossification of certain areas of cranium, while acknowledging that sutures do have a degree of patency, the wet network mechanical tension, diaphragm movement, heart beat fluctuation, etc.

Despite all the mechanical, technical and theoretical details laid out on the paper the question of what exactly happens between the skilled, trained practitioner and the contact of hands on the patient's head remains undefined. There are even some papers of Doctors of Osteopathy teaching at Osteopathic colleges, that insinuate on how inappropriate it is to teach a technique with not much scientific support. Therefore the area of expertise would benefit from further scientific research geared toward more specific detection of cranial movements, such as they were done back in the Dr. Upledger's times.

## REFERENCES

1. Cranial osteopathic manipulative medicine's growing evidence base. King HH. <https://www.ncbi.nlm.nih.gov/pubmed/22302741>. J Am Osteopath Assoc. 2012;112:9
2. Reliability of diagnosis and clinical efficacy of cranial osteopathy: a systematic review. [May;2019 ];Guillaud A, Darbois N, Monvoisin R, Pinsault N. PLoS One. 2016 11:167823
3. Therapeutic effects of cranial osteopathic manipulative medicine: a systematic review. Jäkel A, von Hauenschild P. <https://www.ncbi.nlm.nih.gov/pubmed/22182954>. J Am Osteopath Assoc. 2011;111:685–693
4. Sutherland's legacy in the new millennium: the osteopathic cranial model and modern osteopathy. Bordoni B, Zanier E. <https://www.ncbi.nlm.nih.gov/pubmed/25831430>. Adv Mind Body Med. 2015;29:15–21
5. A massive calcification and ossification of the transverse sinus and the neighbouring dura mimicking meningioma. [May;2019 ];Xu Z, Su C, Xiao Y. BMC Neurol. 2013 13:143
6. A potential mechanism of dural ossification in ossification of ligamentum flavum. Li B, Guo S, Qiu G, Li W, Liu Y, Zhao Y. Med Hypotheses. 2016;92:1–2
7. Evidence based medicine - new approaches and challenges. Masic I, Miokovic M, Muhamedagic B. Acta Inform Med. 2008;16:219–225
8. The influence of breathing on the central nervous system. [May;2019 ];Bordoni B, Purgol S, Bizzarri A, Modica M, Morabito B. Cureus. 2018 10:2724
9. Effect of cranial osteopathic manipulative medicine on cerebral tissue oxygenation. Shi X, Rehrer S, Prajapati P, Stoll ST, Gamber RG, Downey HF. <https://www.ncbi.nlm.nih.gov/pubmed/22182951>. J Am Osteopath Assoc. 2011;111:660–666
10. ATP-sensitive muscle afferents activate spinal trigeminal neurons with meningeal afferent input in rat - pathophysiological implications for tension-type headache. Nöbel M, Feistel S, Ellrich J, Messlinger K. J Headache Pain. 2016;17:75
11. The indeterminable resilience of the fascial system. Bordoni B, Marelli F, Morabito B, Sacconi B. J Integr Med. 2017;15:337–343
12. The awareness of the fascial system. [May;2019 ];Bordoni B, Simonelli M. Cureus. 2018 10:3397
13. A new concept of biotensegrity incorporating liquid tissues: blood and lymph. Bordoni B, Marelli F, Morabito B, Castagna R. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6102753/> J Evid Based Integr Med. 2018;23:2515690–18792838
14. Quantification of motion palpation. Kasparian H, Signoret G, Kasparian J. J Am Osteopath Assoc. 2015;115:604–610
15. Hartman, S.E. Cranial osteopathy: its fate seems clear . *Chiropr Man Therap* 14, 10 (2006). <https://doi.org/10.1186/1746-1340-14-10>